

pressed and then expand out once they are free of the ring compressor. A hose clamp works well for this. Before using a ring compressor or hose clamp, lubricate its ring contact side with engine oil. When using a ring compressor or hose clamp, do not overtighten. The tool should be able to slide freely as the cylinder pushes against it.

- 10A. Compress the rings with a ring compressor or appropriate size hose clamp. Then align the cylinder with the piston and carefully slide it down past the rings. When all of the rings are installed in the

cylinder, hold the cylinder block and remove the ring compressor or hose clamp.

10B. When not using a ring compressor or hose clamp, align the cylinder with the piston and install the cylinder; compress each ring with your fingers as the ring enters the cylinder.

11. Remove the piston holding fixture and slide the cylinder all the way down.

12. While holding the cylinder down with one hand, operate the recoil starter. The piston must move up and down in the bore with no binding or roughness.

#### *NOTE*

*If the piston does not move smoothly, one of the piston rings may have slipped out of its groove when the cylinder was installed. Lift the cylinder and piston up together so there is space underneath the piston. Install a clean rag underneath the piston to catch any pieces from a broken piston ring, then remove the cylinder.*

13. Install the cylinder head and pushrods as described in this chapter.

### PISTON AND PISTON RINGS

The piston is made of an aluminum alloy. The piston pin is made of steel and is a precision fit in the piston. The piston pin is held in place by a clip at each end.

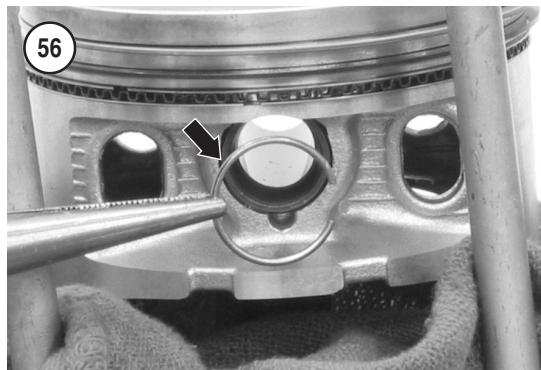
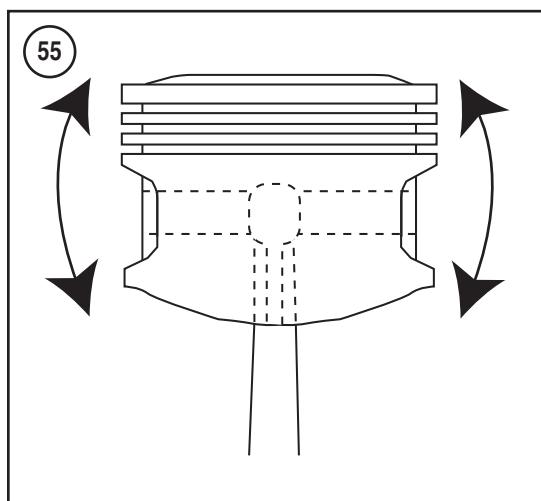
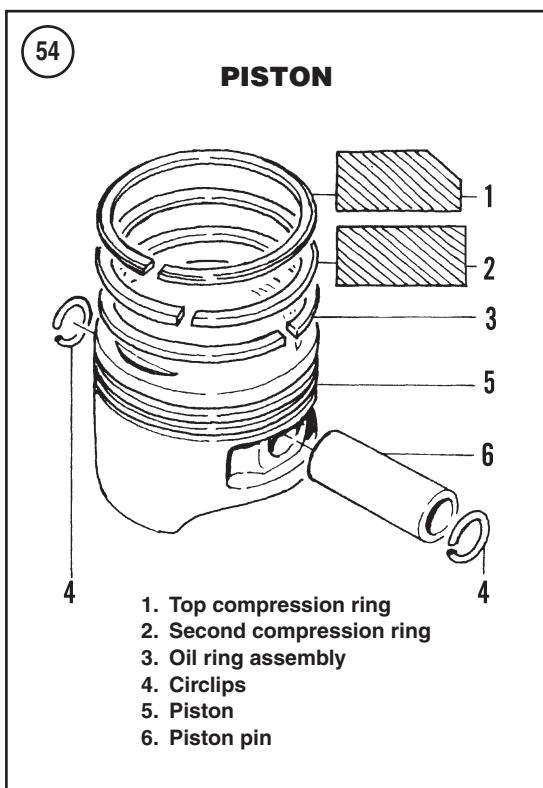
Refer to **Figure 54**.

### Piston Removal/Installation

1. Remove the cylinder as described in this chapter.
2. Block off the crankcase below the piston to prevent the piston pin circlips from falling into the crankcase.
3. Before removing the piston, hold the rod and rock the piston (**Figure 55**). Any rocking motion (do not confuse with the normal sliding motion) indicates wear on the piston pin, rod bore, pin bore, or a combination of all three.

#### *WARNING*

*Wear safety glasses or goggles when removing the circlips in Step 4.*

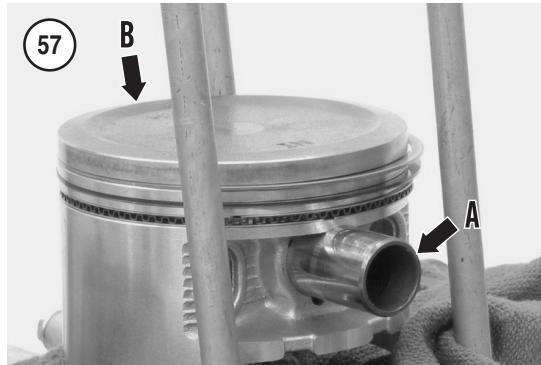


4. Remove the circlips from the piston pin bore grooves (**Figure 56**).

*NOTE*

*Discard the piston circlips. Install new circlips during reassembly.*

5. Push the piston pin (A, **Figure 57**) out of the piston by hand. If the pin is tight, use a homemade tool (**Figure 58**) to remove it. Do not drive the piston pin out as the force may damage the piston pin, connecting rod or piston.
6. Lift the piston (B, **Figure 57**) off the connecting rod.
7. Inspect the piston as described in this chapter.

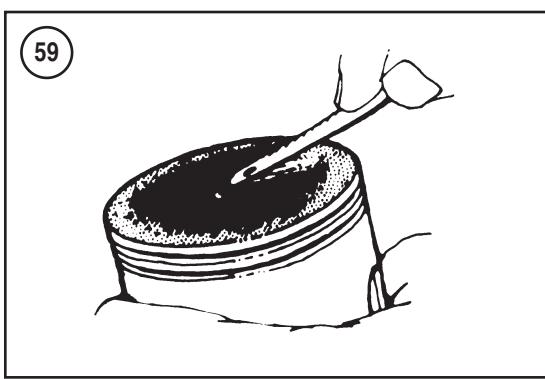
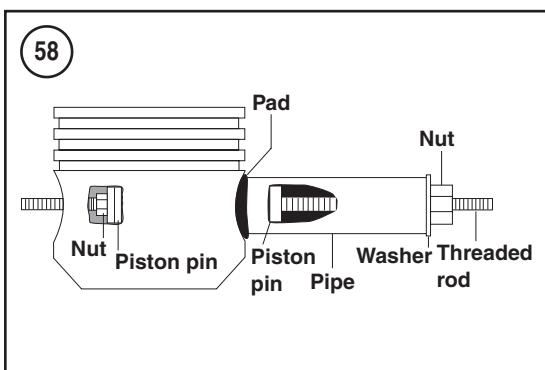


### Piston Inspection

1. Remove the piston rings as described in this chapter.
2. Clean the carbon from the piston crown (**Figure 59**) with a soft scraper. Large carbon accumulations reduce piston cooling and result in detonation and piston damage.

*CAUTION*  
*Do not wire brush the piston skirt.*

3. After cleaning the piston, examine the crown. The crown must show no signs of wear or damage. If the crown appears pecked or spongy-looking, also check the spark plug, valves and combustion



chamber for aluminum deposits. If these deposits are found, the engine is overheating.

4. Examine each ring groove (**Figure 60**) for burrs, dented edges or other damage. Pay particular attention to the top compression ring groove as it usually wears more than the others. Because the oil rings are bathed in oil, their rings and grooves wear less than compression rings and their grooves. If there is evidence of oil ring groove wear or if the oil ring is tight and difficult to remove, the piston skirt may have collapsed due to excessive heat. Replace the piston.
5. Check the piston oil control holes for carbon or oil sludge buildup. Clean the holes with wire.
6. Inspect the piston skirt (**Figure 61**) for cracks or other damage. If the piston shows signs of partial seizure (bits of aluminum on the piston skirt), replace the piston.

#### *NOTE*

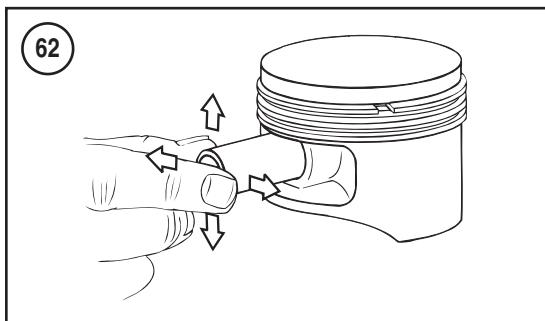
*If the piston skirt is worn or scuffed unevenly from side-to-side, the connecting rod may be bent or twisted.*

7. Check the piston circlip grooves for wear, cracks or other damage. If a circlip groove is worn, replace the piston.
8. Measure piston-to-cylinder clearance as described under *Piston Clearance* in this chapter.

#### Piston Pin Inspection

Refer to **Table 2** when measuring the piston pin components in this section. Replace parts that are out of specification or show damage.

1. Clean and dry the piston pin.
2. Inspect the piston pin for chrome flaking, cracks or signs of heat damage.
3. Lubricate the piston pin and install it in the piston. Slowly rotate the piston pin and check for excessive play as shown in **Figure 62**. Determine piston pin clearance by performing the following steps.
4. Measure the piston pin bore diameter (**Figure 63**) in the piston. If it is within specification, record the dimension and continue with Step 5.
5. Measure the piston pin outside diameter. If it is within specification, record the dimension and continue with Step 6.
6. Subtract the measurement made in Step 5 from the measurement made in Step 4 to determine the piston-to-piston pin clearance. Replace the piston and/or piston pin if the clearance is excessive.



### Connecting Rod Small End Inspection

1. Inspect the connecting rod small end (**Figure 64**) for cracks or signs of heat damage.
2. Measure the connecting rod bore diameter with a snap gauge (**Figure 65**). Then measure the snap gauge with a micrometer and check against the dimension in **Table 2**. If the bore wear is excessive, replace the crankshaft assembly. The connecting rod cannot be replaced separately.

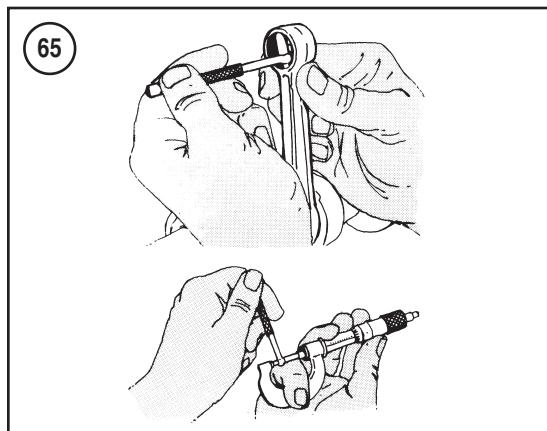
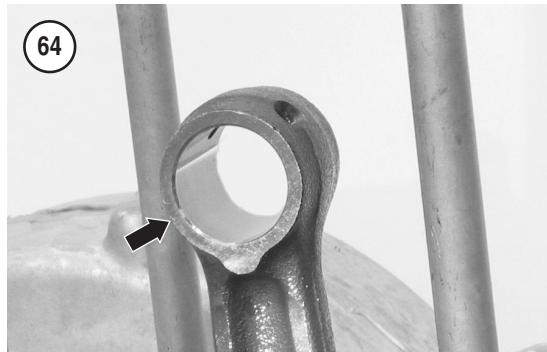
### Piston Clearance

Unless precision measuring equipment and expertise are available, have this procedure performed by a Honda dealership or machine shop.

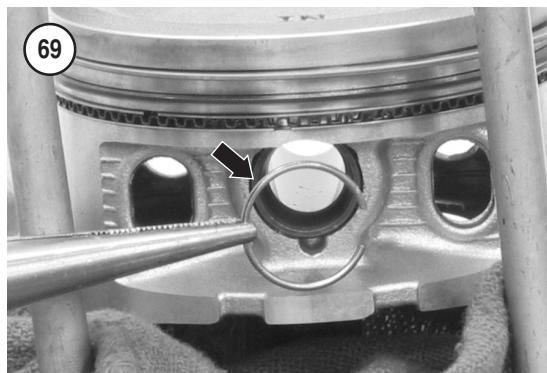
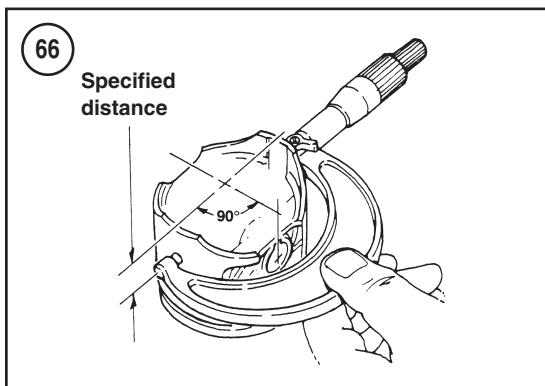
1. Make sure the piston and cylinder walls are clean and dry.
2. Measure the cylinder bore with a bore gauge or inside micrometer (**Figure 49**) at the points shown in **Figure 50**. Measure the bore with the gauge aligned with the piston pin and 90° to the pin. This measurement determines the cylinder bore diameter. Write down the bore diameter measurement.
3. Measure the piston diameter with a micrometer at a right angle to the piston pin bore (**Figure 66**). Measure 15 mm (0.6 in.) from the bottom edge of the piston skirt (**Figure 66**). Write down the piston diameter measurement.
4. Subtract the piston diameter from the largest bore diameter; the difference is piston-to-cylinder clearance. If the clearance exceeds the service limit in **Table 2**, the cylinder must be bored and a new piston/ring assembly must be installed.

### Piston Installation

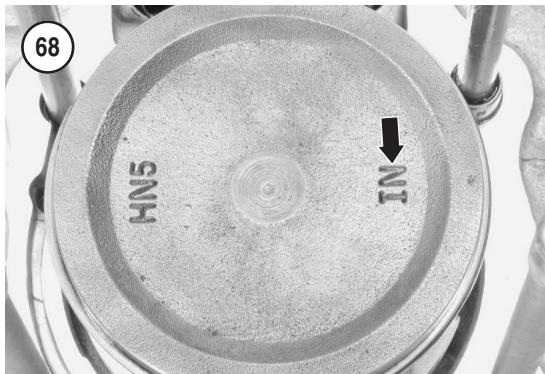
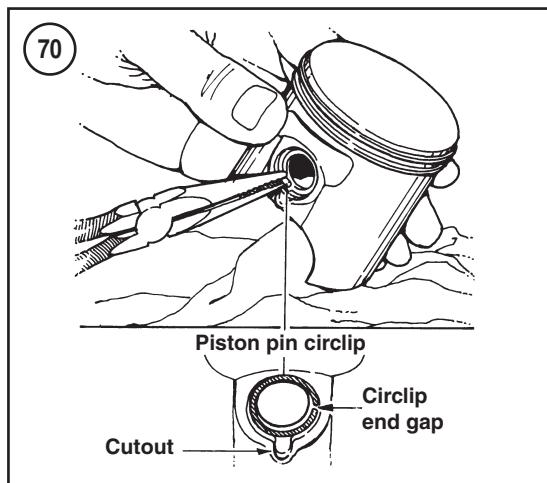
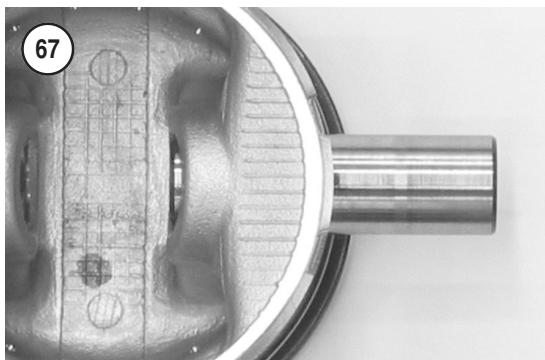
1. Install the piston rings onto the piston as described in this chapter.



2. Coat the connecting rod bore, piston pin and piston with engine oil.
3. Slide the piston pin into the piston until its end is flush with the piston pin boss as shown in **Figure 67**.
4. Place the piston over the connecting rod so the IN mark (**Figure 68**) on the piston crown faces toward the intake side of the engine.
5. Align the piston pin with the hole in the connecting rod. Push the piston pin (A, **Figure 57**) through



4



the connecting rod and into the other side of the piston and center it in the piston.

- Cover the crankcase opening with clean rags.

**WARNING**

*Wear safety glasses or goggles when installing the piston pin circlips in Step 7.*

- Install new piston pin circlips (**Figure 69**) in both ends of the piston pin bore (**Figure 70**). Make sure the circlips seat in the piston clip grooves com-

pletely. Turn the circlips so that their end gaps do not align with the cutout in the piston (**Figure 70**).  
8. Install the cylinder as described in this chapter.

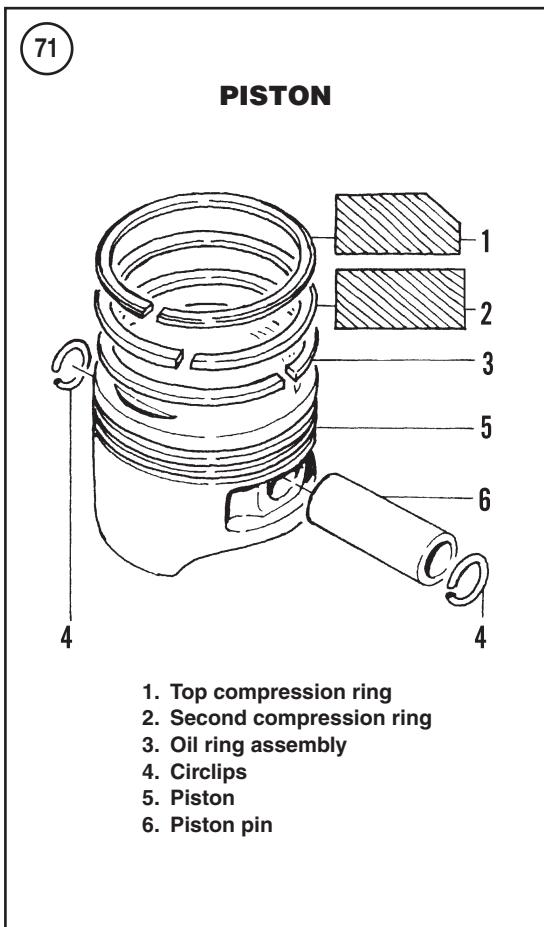
#### Piston Ring Inspection and Removal

A three-ring type piston and ring assembly is used (**Figure 71**). The top and second rings are compression rings. The lower ring is an oil control ring assembly consisting of two ring rails and an expander spacer.

- Measure the side clearance of each compression ring in its groove with a flat feeler gauge (**Figure 72**) and compare the measurement with the specifications in **Table 2**. If the clearance is greater than specified, replace the rings. If the clearance is still excessive with the new rings, replace the piston.

**WARNING**

*The edges of all piston rings are very sharp. Be careful when handling them to avoid cut fingers.*

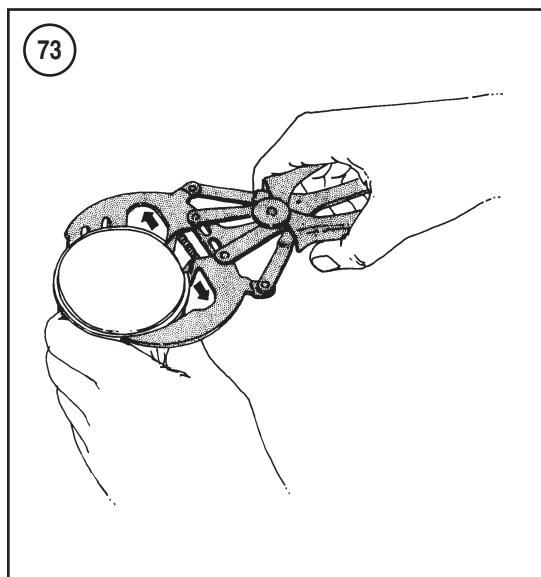
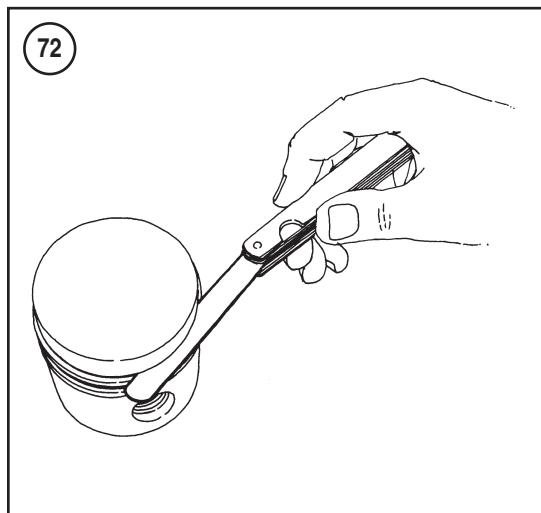


**NOTE**  
Store the rings in order of removal.

2. Remove the compression rings with a ring expander tool (**Figure 73**) or spread the ring ends with your thumbs and lift the rings out of their grooves and up over the piston (**Figure 74**).
3. Remove the oil ring assembly (**Figure 75**) by first removing the upper (A, **Figure 76**) and then the lower ring rails. Then remove the expander spacer (B, **Figure 76**).

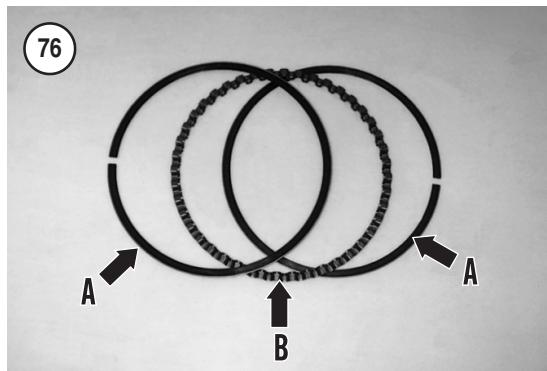
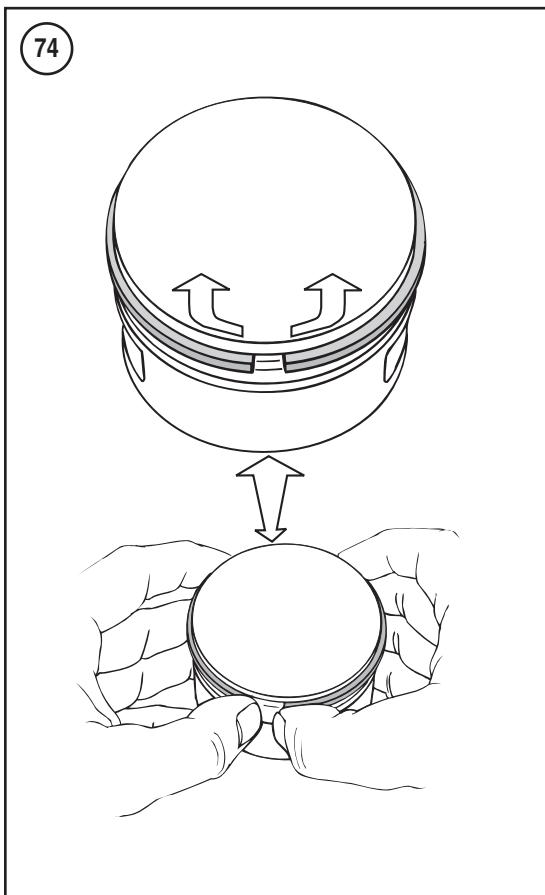
**NOTE**  
*When cleaning the piston ring grooves in Step 4, use the same type of ring that operates in the groove. Using a ring that is dissimilar to the groove will damage the groove.*

4. Using a broken piston ring, remove carbon and oil residue from the piston ring grooves (**Figure 77**).

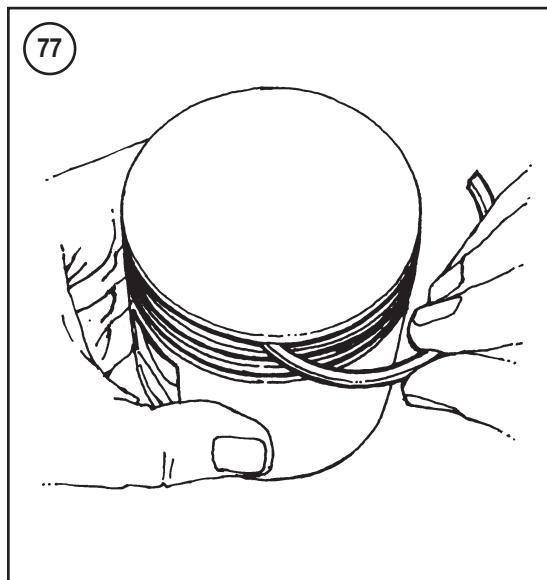


**CAUTION**  
*Do not remove aluminum material from the ring grooves as this will increase ring side clearance.*

5. Inspect the ring grooves for burrs, nicks or broken or cracked lands. Replace the piston if necessary.
6. Check the end gap of each ring. To check, insert the ring into the bottom of the cylinder bore and square it with the cylinder wall by tapping it with the piston (**Figure 78**). Measure the end gap with a feeler gauge (**Figure 78**). Compare the end gap dimension with **Table 2**. Replace the



4



rings if the gap is too large. If the gap on the new ring is smaller than specified, hold a fine-cut file in a vise. File the ends of the ring to enlarge the gap.

#### *NOTE*

*When measuring the oil control ring end gap, measure the upper and lower*

*ring rail end gaps only. Do not measure the expander spacer (B, Figure 76).*

7. Roll each ring around its piston groove (**Figure 79**) to check for binding. Repair minor binding with a fine-cut file.

#### Piston Ring Installation

1. Hone or deglaze the cylinder before installing new piston rings. This machining process will help the new rings seat in the cylinder. If necessary, refer this job to a Honda dealership or motorcycle repair shop. After honing, measure the end gap of each ring and compare it to the dimensions in **Table 2**.

2. Clean the piston and rings with hot soapy water, then dry them with compressed air.
3. If the cylinder was honed, clean the cylinder as described under *Cylinder* in this chapter.
4. Clean the piston and rings in solvent. Dry them with compressed air.

*NOTE*

*The top and second compression rings are different. Refer to Figure 71 to identify the rings.*

5. Install the piston rings as follows:

*NOTE*

*Install the piston rings—first the bottom, then the middle, then the top ring—by spreading the ring ends with your thumbs or a ring expander tool, then slip the rings over the top of the piston.*

- a. Install the oil ring assembly into the bottom ring groove. First install the expander spacer, then the bottom and top ring rails (**Figure 75**).
- b. Install the compression rings with their manufacturer's marks facing up.

*NOTE*

*On OEM pistons, the top compression ring is thinner than the second compression ring.*

- c. Install the second compression ring.
- d. Install the top compression ring.
6. Position the end gaps around the piston as shown in **Figure 71**. Make sure the piston rings rotate freely.

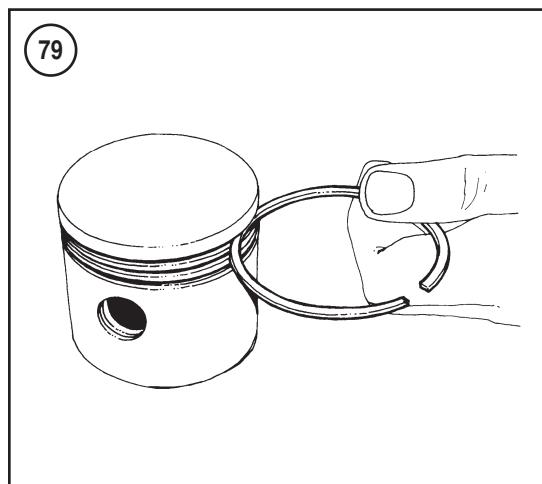
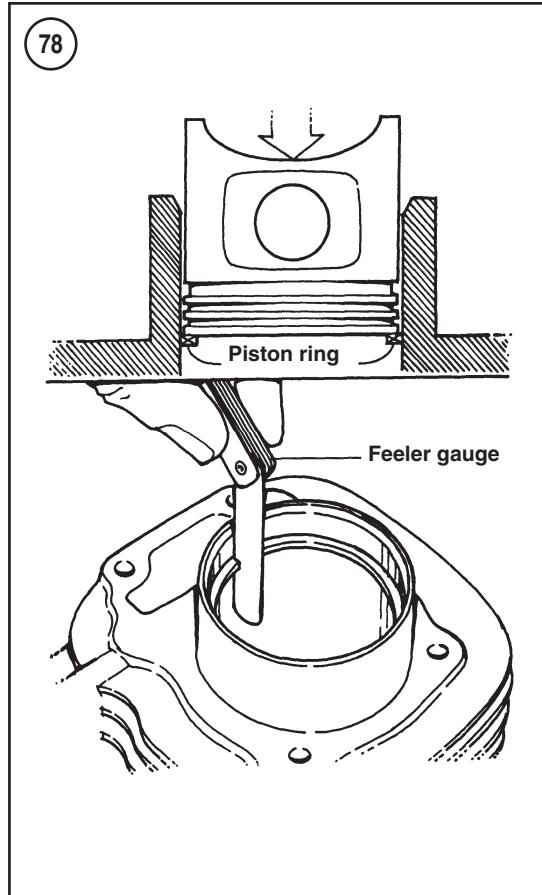
## CAMSHAFT

The camshaft and chain tensioner assembly can be removed with the engine mounted in the frame. Because of the engine's position in the frame, the following illustrations show the engine removed for clarity.

Refer to **Figure 80**.

### Camshaft Removal

1. Remove the cylinder as described in this chapter.



2. Remove the flywheel and starter driven gear (Chapter Five).
3. Remove the two bolts (A, **Figure 81**) and the cam chain tensioner assembly (B).

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